

Abstract

A MRAM includes: first wirings (23), second wirings (21+21r), memory cells (14+14r), a second sense amplifier (3) and a first sense amplifier (2). The first wirings  
5 and second wirings (23, 21+21r) are extended in a first and a second direction (X,Y). The memory cells (14+14r) are placed correspondingly to positions where the first wirings (23) are crossed with the second wirings (21+21r). The second sense amplifier (3) detects a state of a  
10 reference cell (14r) on the basis of an output from the reference cell (14r) provided by corresponding to a reference wiring (21r). The first sense amplifier (2) detects a state of the memory cell (14) on the basis of an output from the reference cell (14r) and an output from  
15 the memory cell (14). The memory cell (14+14r) includes a magnetic tunneling junction element having a laminated free layer. The magnetic tunneling junction element has a magnetization easy axis direction which is different from the first and second directions (X,Y).

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